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# ARITHMETIC.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

## SOLUTIONS OF PROBLEMS.

62. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

A dealer buys milk at $m$=5 cents per quart, and sells it at $n$=6 cents per quart. How much water has he put with the milk, if his rate of profit is $p$=60%?

Solution by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas-Texas, and J. F. YOTHERS, Westerville, Ohio.

$m(1+p)$=price at which a quart of pure milk would sell at a profit of $p$%.

$\frac{m(1+p)}{n}$=number of quarts at $n$ cents sold for $m(1+p)$ cents.

$\therefore \frac{m(1+p)}{n} - 1 = \frac{m(1+p)-n}{n}$=amount of water added to each quart of milk. Let $m$=5, $n$=6, $p$=.60.

$\therefore \frac{m(1+p)-n}{n} = \frac{1}{3}$. $\therefore$ He adds one quart of water to 3 quarts of milk.

Also solved by *E. R. ROBBINS, P. S. BERG, F. R. HONEY.*

63. Proposed by J. A. CALDERHEAD, M. Sc., Professor of Mathematics in Curry University, Pittsburg, Pennsylvania.

I owe A $100 due in 2 years, and $200 due in 4 years; when will the payment of $300 equitably discharge the debt, money being worth 6%?

I. Solution by P. S. BERG, Larimore, North Dakota; EDWARD R. ROBBINS, Lawrenceville, New Jersey; FREDERICK R. HONEY, Ph. B., New Haven, Connecticut.

Present worth of $100 for 2 years at 6%=$89.28.
Present worth of $200 for 4 years at 6%=$161.29.
$250.57=$89.28+$161.29=sum of present worths,
The time required for $250.57 at 6% to amount to $300 is the time sought.
Interest of $250.57 for one year at 6%=$15.0342.
$300−$250.57=$49.43, interest for the whole term.
Hence time equals 49.43÷15.0342=3.2878 years.

II. Solution by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas-Texas; J. F. YOTHERS, Westerville, Ohio.

The interest on $100 for 2 years at 6%=$12.
The interest on $200 for 4 years at 6%=$48.
The interest on $300 for 1 year at 6%=$18.
($12+$48)÷$18=$60÷$18=3 years, 4 months.

Or, \$100 for 2 years = \$ 200 for 1 year.
\$200 for 4 years = \$ 800 for 1 year.

\$1000 for 1 years.

\$1000 ÷ \$300 = 3 years, 4 months.

## PROBLEMS.

67. Proposed by B. F. FINKEL, A. M., Professor of Mathematics and Physics in Drury College, Springfield, Missouri.

A agreed to work a year for \$300 and a suit of clothes. At the end of five months he left, receiving for his wages \$60 and the clothes. What was the suit worth?

68. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

The population of a city is annually increasing $m=2\frac{1}{2}\%$. If the population now is $P=68921$, what was it $n=3$ years ago? At this rate of increase, what will the population be $n=3$ years hence?

# GEOMETRY.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

## SOLUTIONS OF PROBLEMS.

58. Proposed by I. J. SCHWATT, Ph. D., Instructor in Mathematics, University of Pennsylvania, Philadelphia, Pennsylvania.

1. The point of intersection $K_a'$ of the tangent drawn to the circumcircle about the triangle $ABC$ at $A$ and the side $BC$ is harmonic conjugate to $K_a$ with respect to $BC$. ($K_a$ is the point where the symmedian line through $A$ of the triangle $ABC$ meets the side $BC$.)

2. The point $K_a'$ is the center of the Apollonius circle passing through $A$ of the triangle $ABC$.

3. Grebes point is on the line joining the middle point of any side of a triangle with the middle point of the altitude to this side.

I. Solution by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

1. In trilinears, the equation to the circumcircle of the triangle of reference is

$$a\beta\gamma + b\alpha\gamma + c\alpha\beta = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1).$$